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# RE-EVALUATION OF THE LATE BRONZE AGE AND EARLY IRON AGE CHRONOLOGY OF THE WESTERN BELGIAN URNFIELDS BASED ON $^{14}$C DATING OF CREMATED BONES

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**ABSTRACT.** The urnfields in western Belgium have been studied since the second half of the 20th century. Most of these studies, as well as the excavations themselves, date from before the last quarter of the 20th century, except for the urnfields at Velzeke and Blicquy, which were excavated recently. The chronology of these cemeteries was largely based on typochronological studies of pottery. Other funeral gifts, like bronze objects in the graves, are rather exceptional. The typochronology was worked out in a comparison with the framework of neighboring regions and central Europe. There was a need, then, for a chronology based on absolute dates. This was only possible by radiocarbon dating of the cremated bones. Tests on duplicate samples, like cremated bone in context with charcoal or 2 depositions of cremated bones within 1 urn, have shown that the results are reproducible and that there is no discrepancy between the charcoal and the cremated bone dates.

The results of the $^{14}$C dating project on the cremated bones of the 2 urnfields at Velzeke and the one at Blicquy are promising. The interpretation of the occupational history of both sites at Velzeke can be revised, and the currently accepted ceramic sequence for this period needs reworking. In addition, the chronological framework of the Late Bronze Age and Early Iron Age is open for discussion. It seems plausible that the urnfield phenomenon starts earlier in western Belgium than previously expected. These dates can also contribute to the discussion about the transition from the Late Bronze Age to the Early Iron Age.

## THE LATE BRONZE AGE AND EARLY IRON AGE CHRONOLOGICAL FRAMEWORK

Although the archaeological research of urnfield cemeteries of the Late Bronze Age and the Early Iron Age in western Belgium goes back to the mid-19th century, these excavations were no more than the recovery of the urn and the accompanying grave goods. Scientific excavations were not undertaken before the second half of the 20th century. From the 27 documented urnfields in western Belgium, only 8 sites were found after the 1950s. Among the most recently excavated sites are the cemeteries of Velzeke Paddestraat, Velzeke Provinciebaan (East-Flanders province), and Blicquy-Ville d'Anderlecht (Hainaut province). Until this study, the chronology of the Late Bronze Age and Early Iron Age in western Belgium was based on pottery typology and metal objects from the urnfields.

The first chronological scheme for the western Belgian urnfields was published by De Laet (1958). He was influenced by the work of Kimmig on the urnfield culture in Baden (Germany) (Kimmig 1940). In 1968, the typochronological framework of the cemeteries for the region between the North Sea and the Lower Rhine was further refined by Desittere (1968). A revision of the chronology in the 1980s and the introduction of the notion "groupe Rhin-Suisse-France oriental" for central European cultural influences in the Late Bronze Age resulted in a new chronological evaluation of the excavated sites (Bourgeois 1989). The dating of these cemeteries was largely based on the internal evolution of the pottery forms in the urnfields in association with the study of the ceramic finds from

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the lesser-known settlements. The local typochronology was further developed in comparison with the framework of neighboring regions and central Europe (Table 1).

Table 1 Chronological sequence of the Late Bronze Age and Early Iron Age in central and western Europe based primarily on typology.

| Muller-Karpe (Germany) (1959) | Hatt (France) (1961) | Dates BC |
|---|---|---|
| Bronzezeit D | Bronze final I | 1300–1200 |
| Hallstatt A1 | Bronze final IIa | 1200–1100 |
| Hallstatt A2 | Bronze final IIb | 1100–1000 |
| Hallstatt B1 | Bronze final IIIa | 1000–900 |
| Hallstatt B2/3 | Bronze final IIIb | 900–750 |
| Hallstatt C | Hallstatt ancien | 750–600 |
| Hallstatt D | Hallstatt moyen/final | 600–450 |

The Early Iron Age in Europe saw the introduction of burials accompanied by sets of bronze and iron weaponry, horse gear, razors, and other assorted personal items. In the studied area, this change in the funeral ritual is absent in the cemeteries. During this period, grave goods consist mostly of pottery alone.

A connection between the typochronology of the pottery and the metal objects is difficult to establish due to the rather occasional appearance of both types of artifacts in the same archaeological context of the urnfield cemeteries. There is a need to establish a chronological framework based on absolute dating for the urnfield cemeteries of western Belgium.

Recently, new chronologies were put forward. Lanting and van der Plicht (2001/2002) proposed a chronology based on radiocarbon and dendrochronology (Table 2). Trachsel (2004) also used absolute dates in combination with typological studies primarily based on metal objects. Unfortunately, in some regards those chronologies do not agree. For example, the Hallstatt B2 is not recognized by Lanting and van der Plicht but is still recognized by Trachsel. As a working hypothesis we accepted the old chronology by Müller-Karpe (1959) and Hatt (1961).

Table 2 Chronological sequence of the Late Bronze Age and Early Iron Age in southern Germany and neighboring areas based on absolute dates.

| Lanting and van der Plicht (2001/2002) | Calendar yr BC | $^{14}$C yr BP |
|---|---|---|
| Bronzezeit D | 1325–1200 | 3100–3000 |
| Hallstatt A1 | 1200–1125 | 3000–2950 |
| Hallstatt A2 | 1125–1025 | 3000–2875 |
| Hallstatt B1 | 1025–925 | 2875–2800 |
| Hallstatt B2 | — | — |
| Hallstatt B3 | 925–800 | 2800–2650 |
| Hallstatt C | 800–625 | 2650–2450 |
| Hallstatt D | 625–480 | 2500–2400 |

## DESCRIPTION OF THE SITES

### Velzeke Paddestraat and Provinciebaan

Both Paddestraat and Provinciebaan are located on a loam-covered plateau, oriented northeast-southwest between 2 brooks, Molenbeek to the south and Passemarebeek to the north (Figure 1).


Figure 1 Location of the site Velzeke Paddestraat and Provinciebaan and the site of Blicquy, Belgium (copyright Centre de recherches archéologiques [CReA], Université Libre de Bruxelles).

The cemetery of the Paddestraat site lies in the upper section of the southern slope that descends to the Molenbeek brook, between 50 and 55 m in elevation. Forty-one cremation graves were uncovered during several archaeological campaigns (De Mulder and Rogge 1995): 40 urngraves and 1 "bonepackgrave," a deposition of cremated bone. For the study of the occupational history of the cemetery, 22 urngraves could be used. The ceramic typology suggests the start of the graveyard during the Hallstatt A2–B1 (Ha A2–B1) phase. The site is still functioning at the beginning of the Early Iron Age (Ha C), but seems to be abandoned during this period.

The second urnfield, called Provinciebaan, is located 1 km east of Paddestraat. The first cremation graves were found during the excavation of the Gallo-Roman settlement in this area. The urnfield is also situated on the southeastern slope of the Velzeke plateau, which descends in a western direction to a clearly marked steep depression in the landscape. Ten urngraves and 1 deposition of a bonepackgrave in a ring ditch were uncovered (De Mulder and Rogge 1995). Due to the later intensive Gallo-Roman occupation of this area, many graves must have been destroyed. In the ring ditch, no central grave was found. Four cremations could, on basis of the pottery forms, be dated to the Early Iron Age. A 5th grave dates to the same period based upon some iron fragments found in the urn. Based on the typology, the occupation phase seems to start at the transition of the Late Bronze

Age and Early Iron Age around 750 BC. Like the other sites in western Belgium, the urnfield at Provinciebaan was abandoned during the course of the Early Iron Age. The last urnfield activity ceases during Hallstatt D (600–450 BC). An exact date is not archaeologically available, but none of the urnfields disclose traces of use during the beginning of the Late Iron Age (~450 BC).

### Blicquy

The site of Blicquy is situated near the source of the Dendre River, southwest of the city of Ath in an area rich in Bronze and Iron Age sites (Henton and Demarez 2005). The cemetery lies at the foot of a gentle slope with a southeast/northwest orientation, bound to the west by the Chapelle-à-Oie brook. The site was excavated during several campaigns (Henton et al. 1997; Gillet et al. 2006).

The cemetery spreads over some 5000 $m^2$. The western and southern limits seem to have been found, while the graveyard could extend further to the north and to the west. A least 35 tombs have been found, while 3 structures are uncertain. There are 26 cremations in urns, 7 bonepackgraves, and 2 graves consisting of a mixed packet of cremated bone and charcoal deposited in a pit (*Brandgrubengräber* in German), concentrated in the northern part of the cemetery. The establishment of the La Tène ritual area, followed by a Roman sanctuary, and finally, the site's agricultural cultivation explain the disturbance of the graves and the decapitation of most of the urns. The presence of the Bronze Age cemetery could explain the later ritual character of the zone and the implantation of the protohistoric sanctuary.

## MATERIALS AND METHODS

Due to the absence of charcoal in most of the urns, we decided to use cremated bones in this study. The results obtained in the Netherlands (Lanting et al. 2001) and during an interlaboratory intercomparison (Naysmith et al., these proceedings) showed the validity of cremated bone as a dating material.

### Pretreatment

Tests have shown that only cremated bones with a pale white color can be dated by $^{14}C$ (Van Strydonck et al. 2005). Blackish bones are symptomatic of an incomplete cremation, making the bones much more vulnerable for contamination. In the same study, we also found that there is a surface effect, resulting in ion exchange with the environment. To avoid this kind of contamination, no spongy parts of the bones were used. Furthermore, the surface of the bone samples was leached away with 1% HCl. Then, the bones were broken to see if the inside was completely cremated as well as the outside of the bones. Finally, the bones were ground to powder.

### Sample Preparation

$CO_2$ was extracted with phosphoric acid. Before graphitization (with $H_2$ over a Fe catalyst), the $CO_2$ gas was cleaned by heating for 30 min at 1000 °C in the presence of Ag. Targets were prepared at the Royal Institute for Cultural Heritage in Brussels (Belgium) and measured at the Leibniz Labor für Altersbestimmung und Isotopenforschung in Kiel (Germany).

### Quality Assurance Tests

Some graves contained cremated bones as well as charcoal. In those cases, the bones as well as the charcoal were dated (Table 3).

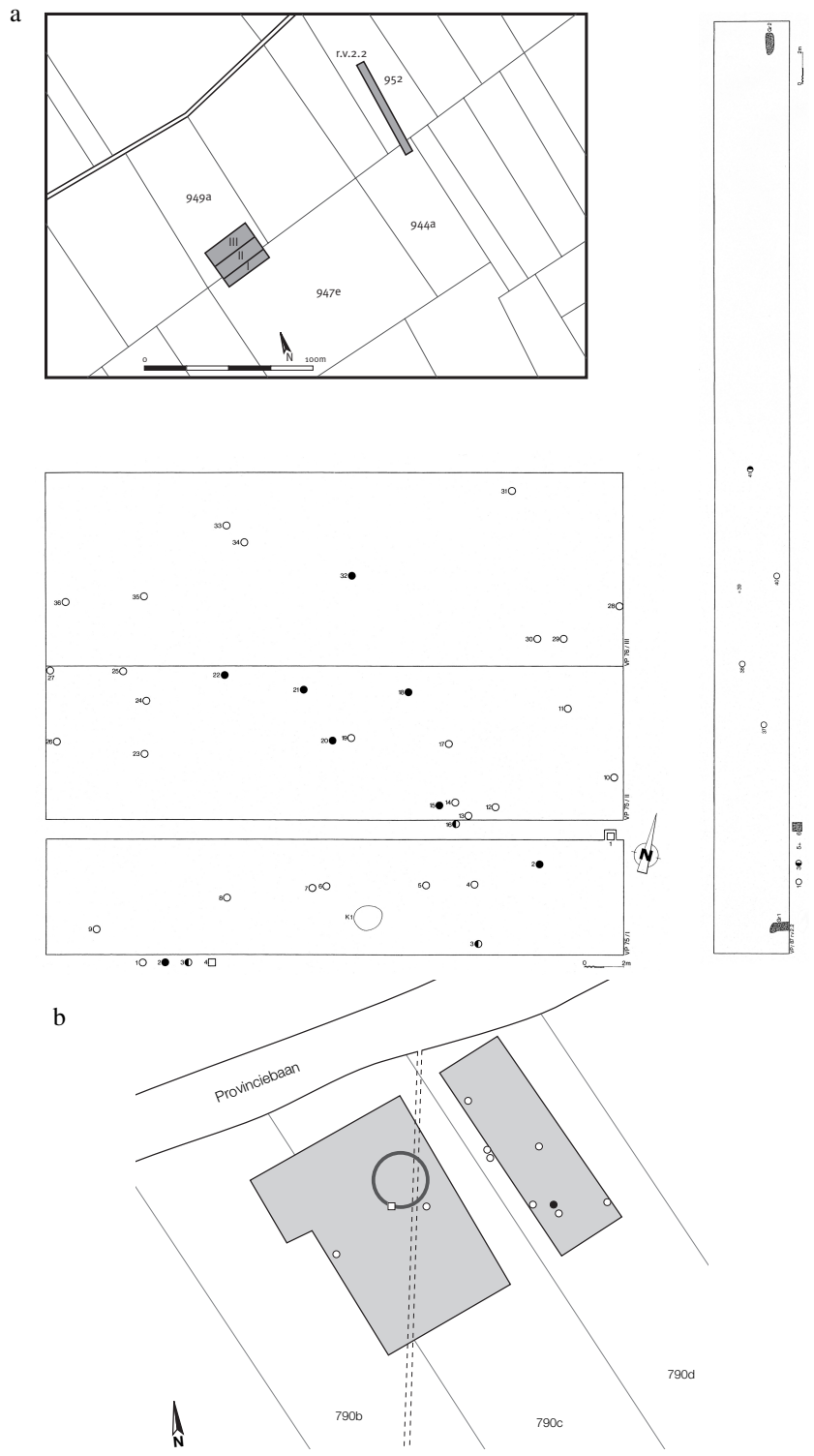
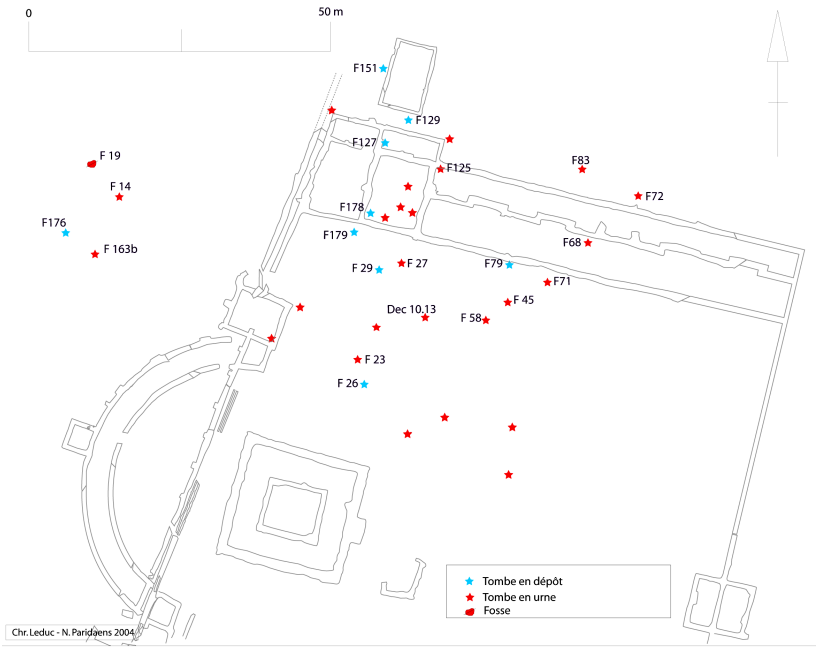



Figure 2 The sites Velzeke Paddestraat (a) and Velzeke Provinciebaan (b) (De Mulder and Rogge 1995)




*Plan de la nécropole Age du Bronze de Blicquy - "Ville d'Anderlecht".*

Figure 3 Plan of the necropolis of the site Blicquy "Ville d'Anderlecht" (copyright Centre de recherches archéologiques [CReA], Université Libre de Bruxelles).

Table 3 Dates on charcoal and bone carbonate from the same grave.

| Grave # | Charcoal (BP) | Carbonate (BP) |
|---|---|---|
| **Paddestraat** | | |
| 2 | KIA-15733: 2870 ± 30 | KIA-20075: 2870 ± 25 |
| 6 | KIA-15703: 2790 ± 30 | KIA-20200: 2785 ± 25 |
| 18 | KIA-15734: 2900 ± 30 | KIA-20064: 2920 ± 30 |
| 20 | KIA-15735: 2780 ± 30 | KIA-20201: 2825 ± 25 |
| 32 | KIA-15736: 2875 ± 30 | KIA-20076: 2880 ± 25 |
| **Provinciebaan** | | |
| 1 | KIA-15737: 1960 ± 30 | KIA-20058: 2595 ± 25 |
| 6 | KIA-15723: 2600 ± 30 | KIA-20070: 2565 ± 25 |
| **Blicquy** | | |
| F68 | KIA-23746: 3080 ± 30 | KIA-23758: 3010 ± 30 |
| F125 | KIA-23745: 2945 ± 30 | KIA-23757: 3110 ± 30 |
| F127 | KIA-23744: 3160 ± 40 | KIA-23766: 2975 ± 30 |
| F129 | KIA-23747: 3075 ± 30 | KIA-23752: 3185 ± 30 |

There is a perfect match between the charcoal dates and the carbonate dates from Paddestraat. At Provinciebaan, the charcoal from grave 1 is much younger than the bone date, but from an archaeological point of view, the carbonate date is much more reliable than the charcoal date. The charcoal is considered an intrusion from the younger Roman occupation of the site.

At first sight, the situation at Blicquy is less favorable. The largest difference between charcoal and carbonate is 180 ± 50 $^{14}$C yr (grave F127). The difference in age between the 2 materials is probably not due to a contamination, but due to a perturbation of the material. A lot of urns at Blicquy are decapitated (see Figure 4). This must have happened already in prehistoric times during the leveling of the terrain for a new purpose. During the Late Iron Age and the Roman period, the terrain was leveled and reused for other purposes. The construction of an important Gallo-Roman sanctuary significantly altered the site. The perturbation hypothesis is supported by the following:

1. The fact that the urns contained hardly any bone material anymore;
2. The few bones present were not found at the bottom of the urn, but dispersed in the soil fill of the urn;
3. Because of the chemical homogeneity of the soil, and therefore a "one event" disturbance, one would expect the bones to be either always older or always younger than the charcoal. This is not the fact. In some cases, the charcoal is older while in other cases the bone is older, but the charcoal samples delimit the same overall period as the bones samples;
4. In grave F72, a small urn was found in situ inside a larger one (see Figure 7, #9). The date from the bone inside the larger urn was statistically the same as the bone from the smaller one (see Table 4).

Figure 4 One of the decapitated urns from Blicquy (courtesy and copyright Mark Van Strydonck).

Table 4 Two bone carbonate dates (BP) from grave F72 at Blicquy.

| F72pu (small urn) | F72gu (larger urn) | Average |
|---|---|---|
| KIA-24017: 2900 ± 35 | KIA-24002: 2955 ± 30 | 2932 ± 23 |

### Comparison Between the Typochronological Date and $^{14}$C Date

To compare the typochronological date with the $^{14}$C date, the same method was applied as for art objects (Van Strydonck et al. 2004). In this method, the typochronological age range is supposed to be the 2-σ range of all possible dates. Furthermore, it was supposed that the objects (urns) of one type (style) are normally distributed over this age range, accepting that there is higher probability that the urn comes from the central part of the age range rather than from the periphery. In Figure 5, one example is depicted in detail.

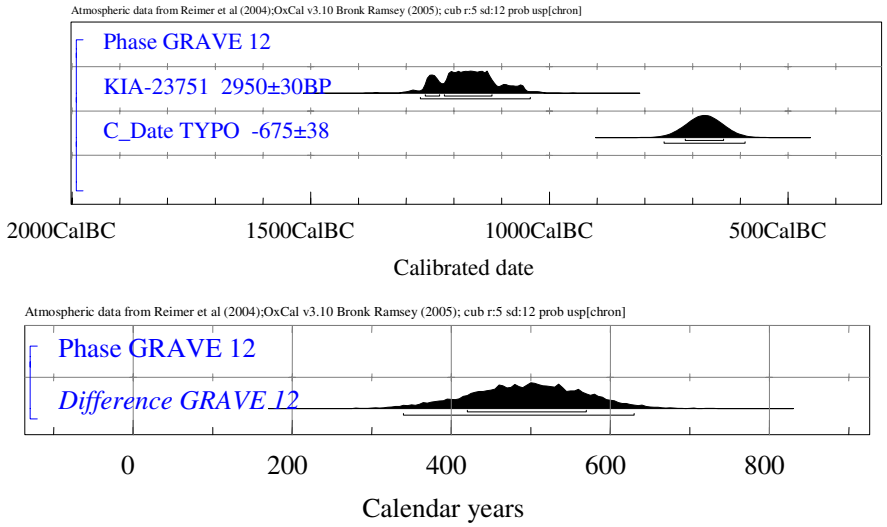



Figure 5 The urn of grave 12 at Provinciebaan was typologically dated to the Ha C period (750–600 BC). In the adopted model, this corresponds to a normal distribution of 675 ± 38 BC. The difference between the $^{14}$C age (2950 ± 30 BP) and the typological date is 580–420 yr at 68.2% probability and 630–350 yr at 95.4% probability.

## RESULTS

From the 41 cremation graves at the site of Velzeke Paddestraat, 21 have been dated on bone carbonate. From Velzeke Provinciebaan, 8 samples have been dated. From Blicquy, 14 graves were dated on cremated bones. This set of information comes not from complete urns, but from incomplete pots that were partly destroyed due to leveling of the area. All results are presented in Figure 6 and Table 5.

Table 5 $^{14}$C dating results for the sites Paddestraat, Provinciebaan, and Blicquy.

| Grave # | Date BP | Calibrated date (2 σ) | Typological date | Span at 2 σ (yr) |
|---|---|---|---|---|
| **Paddestraat** | | | | |
| 18 | KIA-20064: 2920 ± 30 | 1260 (3.6%) 1230 BC<br>1220 (91.8%) 1010 BC | 1100–750 (Ha A2–B) | 400–0 |
| 35 | KIA-23145: 2900 ± 30 | 1210 (95.4%) 1000 BC | — | |
| 32 | KIA-20076: 2880 ± 25 | 1160 (1.0%) 1140 BC<br>1130 (94.4%) 970 BC | 900–750 (Ha B2/3) | 370–110 |
| 34 | KIA-23146: 2875 ± 30 | 1190 (1.4%) 1170 BC<br>1160 (1.7%) 1140 BC<br>1130 (88.1%) 970 BC<br>960 (4.2%) 930 BC | — | |
| 2 | KIA-20075: 2870 ± 25 | 1130 (92.4%) 970 BC<br>960 (3.0%) 930 BC | 1000–750 (Ha B) | 320–20 |
| 20 | KIA-20201: 2825 ± 25 | 1050 (95.4%) 910 BC | 900–750 (Ha B2/3) | 260–40 |
| 13 | KIA-23418: 2810 ± 30 | 1050 (95.4%) 890 BC | 900–750 (Ha B2/3) | 250–20 |
| 21 | KIA-21786: 2800 ± 25 | 1020 (94.4%) 890 BC<br>870 (1.0%) 850 BC | 1100–1000 (Ha A2) | 180–0 |
| 15 | KIA-21785: 2795 ± 25 | 1020 (93.0%) 890 BC<br>870 (2.4%) 850 BC | — | |
| 14 | KIA-23127: 2790 ± 30 | 1010 (95.4%) 840 BC | 1100–900 (Ha A2–B1) | 180–(–10) |
| 6 | KIA-20200: 2785 ± 25 | 1010 (87.0%) 890 BC<br>880 (8.4%) 840 BC | 1000–900 (Ha B1) | 100–(–5) |

Table 5 $^{14}C$ dating results for the sites Paddestraat, Provinciebaan, and Blicquy. *(Continued)*

| Grave # | Date BP | Calibrated date (2 σ) | Typological date | Span at 2 σ (yr) |
|---|---|---|---|---|
| 36 | KIA-21794: 2785 ± 25 | 1010 (87.0%) 890 BC<br>880 (8.4%) 840 BC | 1100–750 (Ha A2–B) | 200–(–10) |
| 87r.v.3 | KIA-21797: 2785 ± 30 | 1010 (95.4%) 840 BC | — | |
| 11 | KIA-21798: 2745 ± 25 | 970 (2.5%) 950 BC<br>940 (92.9%) 820 BC | 900–750 (Ha B2/3) | 150–(–10) |
| 19 | KIA-23139: 2745 ± 30 | 980 (95.4%) 810 BC | 1000–900 (Ha B1) | 120–(–10) |
| 30 | KIA-23117: 2715 ± 30 | 920 (95.4%) 800 BC | 1100–1000 (Ha A2) | 260–110 |
| 27 | KIA-21790: 2700 ± 35 | 920 (95.4%) 800 BC | 1100–900 (Ha A2–B1) | 260–10 |
| 25 | KIA-21793: 2665 ± 25 | 900 (8.6%) 860 BC<br>850 (86.8%) 790 BC | 900–750 (Ha B2/3) | 90–(–5) |
| 26 | KIA-21789: 2650 ± 30 | 900 (95.4%) 780 BC | 1100–750 (Ha A2–B) | 250–(–10) |
| 23 | KIA-23140: 2575 ± 35 | 820 (66.1%) 740 BC<br>690 (12.4%) 660 BC<br>650 (17.0%) 550 BC | — | |
| 87r.v.2 | KIA-22266: 2470 ± 35 | 770 (85.6%) 480 BC<br>470 (9.8%) 410 BC | — | |
| **Provinciebaan** | | | | |
| 12 | KIA-23751: 2950 ± 30 | 1270 (95.4%) 1040 BC | 750–600 (Ha C) | 640–350 |
| 14 | KIA-24021: 2745 ± 45 | 1000 (95.4%) 810 BC | — | |
| 3 | KIA-24026: 2695 ± 33 | 910 (95.4%) 800 BC | — | |
| 1 | KIA-20058: 2595 ± 25 | 810 (94.2%) 760 BC<br>680 (1.2%) 670 BC | 750–450 (Ha C–D) | 340–10 |
| 8 | KIA-24020: 2575 ± 30 | 810 (75.3%) 740 BC<br>690 (11.2%) 660 BC<br>650 (7.9%) 590 BC<br>580 (1.0%) 560 BC | — | |
| 6 | KIA-20070: 2565 ± 25 | 810 (74.8%) 740 BC<br>690 (13.1%) 660 BC<br>640 (7.4%) 590 BC | 750–600 (Ha C) | 180–0 |
| 2 | KIA-24027: 2555 ± 30 | 810 (53.5%) 740 BC<br>690 (16.4%) 660 BC<br>650 (25.5%) 550 BC | 750–450 (Ha C–D) | 290–(–10) |
| 4 | KIA-24029: 2480 ± 30 | 770 (90.9%) 480 BC<br>470 (4.5%) 410 BC | — | |
| **Blicquy** | | | | |
| F129 | KIA-23752: 3185 ± 30 | 1520 (95.4%) 1410 BC | — | |
| F125 | KIA-23757: 3110 ± 30 | 1450 (95.4%) 1300 BC | 1000–750 (Ha B) | 660–250 |
| F68 | KIA-23758: 3010 ± 30 | 1390 (95.4%) 1120 BC | 1100–900 (Ha A2–B1) | 430–110 |
| F26 | KIA-24014: 3000 ± 35 | 1380 (95.4%) 1120 BC | — | |
| F45 | KIA-24010: 3000 ± 30 | 1380 (8.1%) 1330 BC<br>1320 (87.3%) 1120 BC | 1100–900 (Ha A2–B1) | 410–80 |
| F23 | KIA-24015: 2995 ± 30 | 1380 (5.5%) 1340 BC<br>1320 (89.9%) 1120 BC | — | |
| F127 | KIA-23766: 2975 ± 30 | 1320 (95.4%) 1110 BC | — | |
| F79 | KIA-24006: 2945 ± 35 | 1270 (95.4%) 1020 BC | — | |
| F27 | KIA-24003: 2945 ± 35 | 1270 (95.4%) 1020 BC | — | |
| F72 gu+pu | AVERAGE: 2932 ± 23 | 1260 (6.0%) 1230 BC<br>1220 (89.4%) 1040 BC | 1000–900 (Ha B1) | 320–70 |
| F178 | KIA-24007: 2925 ± 40 | 1270 (95.4%) 1000 BC | — | |
| F179 | KIA-23998: 2920 ± 35 | 1260 (5.4%) 1230 BC<br>1220 (90.0%) 1000 BC | — | |
| F71 | KIA-23990: 2905 ± 30 | 1220 (95.4%) 1000 BC | — | |
| F83 | KIA-24011: 2495 ± 30 | 790 (95.4%) 510 BC | — | |

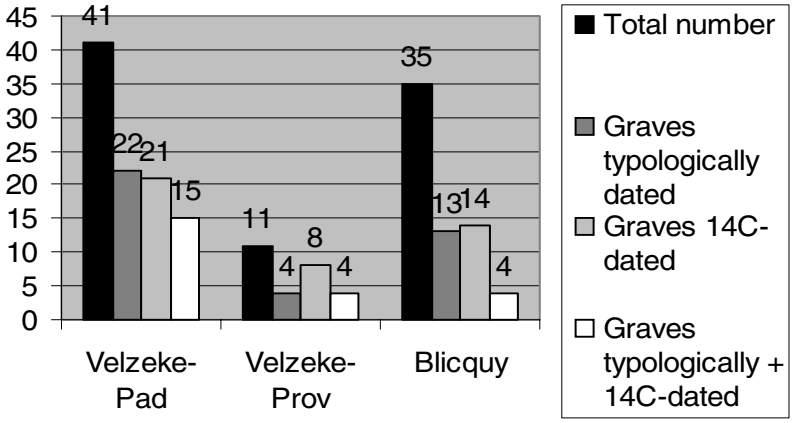



Figure 6 The total number of cremations and the number of graves typologically and $^{14}C$ dated from the cemeteries at Velzeke Paddestraat, Velzeke Provinciebaan, and Blicquy.

## CHRONOLOGICAL DISCUSSION

Based on our investigation, there seems to be a difference between the classical typochronology of some pottery forms and the results from $^{14}C$ dating of the cremated bones. Biconical, sharp-angled forms are traditionally considered as the chronological guide for the oldest phase of the Late Bronze Age (Ha A2–B1) in western Belgium. Some biconical urns in the urnfield at Velzeke Paddestraat have a younger $^{14}C$ age. Two urns (graves 21 and 30) are typochronologically dated between 1100 and 1000 BC (Ha A2). $^{14}C$ dating places these graves between 920–800 cal BC (grave 30) (Figure 7, #1) and 1010–890/880–840 cal BC (grave 21) (Figure 7, #2). Grave 27 was typochronologically dated between 1100–900 BC and $^{14}C$ dated between 950–800 cal BC. This indicates a tendency towards a younger absolute date than attributed by the archaeologists. In contrast with these dates, the carinated urn with everted neck (Figure 7, #9) at the necropolis of Blicquy (grave F72-average) is older according to the $^{14}C$ dates (1260–1230/1220–1040 cal BC), but statistically can still belong to this phase.

Another urn type, a biconical form with handles, is considered characteristic for the "groupe Rhin-Suisse-France orientale." The appearance of this shape in the urnfields of western Belgium is representative for the central European influence in this region during Ha A2–B1. The $^{14}C$ date of this urn type at Velzeke Paddestraat is between 1010–890 and 880–830 cal BC (grave 14) (Figure 7, #3). The age of this typical object is again younger then expected and seems to follow the same pattern as the above-mentioned $^{14}C$ dates from Velzeke Paddestraat. A similar type is also evident at Blicquy (grave F45). Here, the carinated profile is less sharp and more rounded (Figure 7, #10). This characteristic is, from a typomorphological point of view, interpreted as typical for a younger age. This handled urn is classically attributed to Ha B1 (Petrequin et al. 1985). The $^{14}C$ date turns out to be older: 1320–1120 cal BC. Consequently, this urn is a Ha A1 product instead of belonging to the younger Ha B1 period; however, one has to be cautious in the interpretation of the Blicquy urns. It is very unclear if the cremated remains are still in situ as demonstrated above.

At the cemeteries of Blicquy and Velzeke Paddestraat, shouldered beakers were found that had been placed in the grave as a gift to the deceased. This is also a form that fits well in the chronology of the Late Bronze Age and represents the period Ha A2–B1. Both beakers can be typologically attributed to the Ha B1 phase (1000–900 BC). In the cemetery of Blicquy, this form is dated between

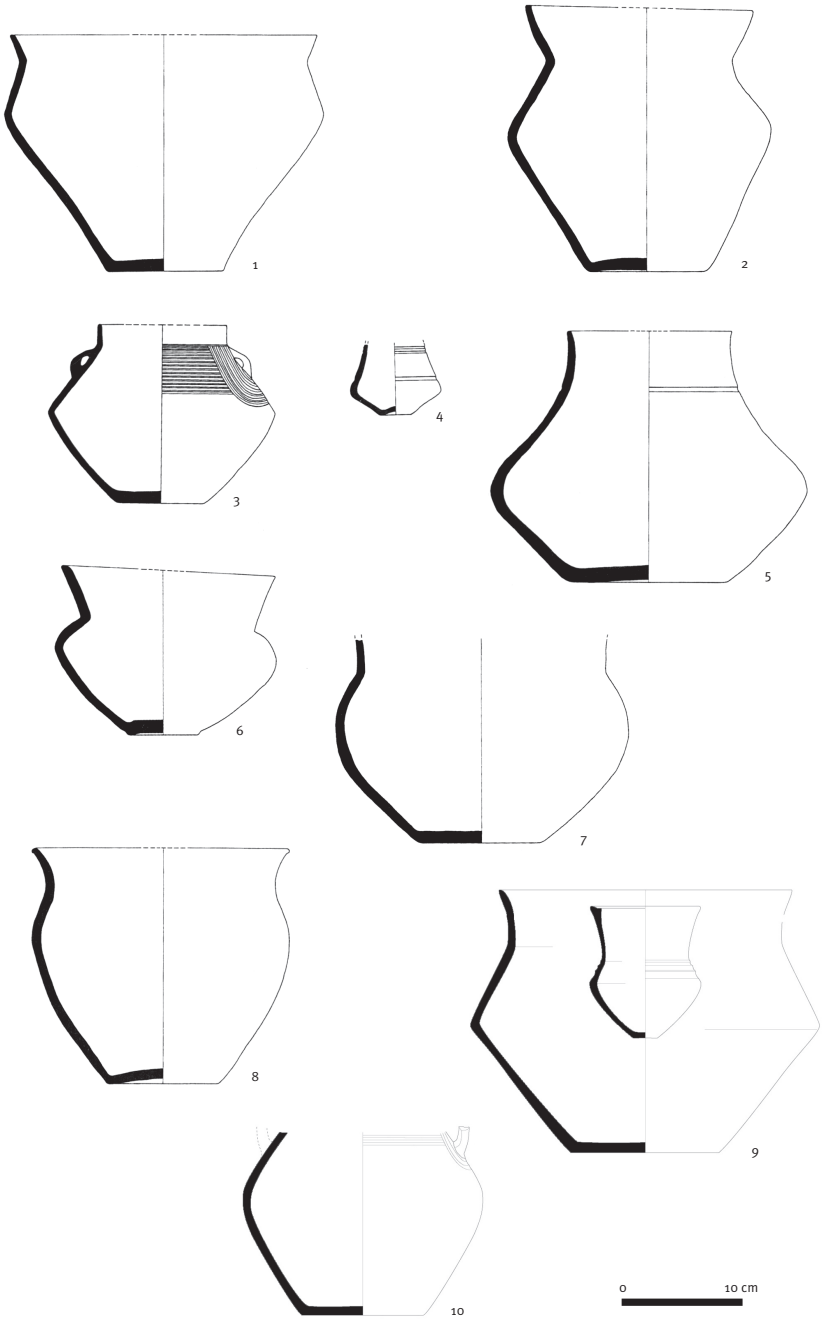



Figure 7 Urns from Velzeke Paddestraat (1–5), Velzeke Provinciebaan (6–8), and Blicquy (9–10)

1260–1230 and 1220–1040 cal BC (Figure 7, #9). The one at Velzeke has a younger $^{14}$C date and ranges from 1000–890 and 880–830 cal BC (Figure 7, #4). If we limit the $^{14}$C date to 1 σ (1000–985/975–950/945–895 cal BC), then the beaker at Paddestraat matches with the proposed typochronological age of the object.

In the latest phase of the Late Bronze Age, Ha B2/3, which archaeologists place at 900–750 BC, there is an evolution in the pottery to more rounded forms. The typical angular, biconical shapes make way for more curved urns. A few $^{14}$C dates are available for pottery from this period at the Velzeke Paddestraat necropolis. Grave 32 yielded an age between 1160–1140/1130–970 cal BC. Cremation graves 20 (Figure 7, #5) and 13 have about the same calibrated age, respectively, 1050–910 and 1050–890 cal BC. The opposite phenomenon is attested with this group of urns in comparison with the carinated, biconical forms. Their $^{14}$C date is older than the supposed typochronological age from 900 until 750 BC. In the internal chronology from the cemetery at Velzeke Paddestraat, there is a complete reversal of the presumed chronological framework.

A typical form for the Early Iron Age ceramics is the so-called Schrägrandurn. The body of this type of pottery can be slightly carinated or rounded, but typically have a large, sharp everted neck. This kind of urn is very frequently attested in cemeteries and settlements in western Belgium and also in the eastern part of Flanders and the Netherlands, and is according to $^{14}$C dates on Dutch material considered as belonging to the Early Iron Age (Lanting and van der Plicht 2001/2002). A single $^{14}$C date on this type of urn at Velzeke Provinciebaan delivered a totally different age (Figure 7, #6). After calibration, the cremated bones are chronologically placed between 1290–1140 BC, in the transition of the Middle Bronze Age–Late Bronze Age. A $^{14}$C depth profile of the bone seems to indicate that the sample is suitable for dating (Van Strydonck et al. 2005). If so, there must be an archaeological-anthropological explanation for this discrepancy. Anthropologically, there are examples of the burying of ancestors at a later stage (Parker Pearson 1999). Recently, a Bronze Age example of this phenomenon has been excavated at the site of Cladh Hallan (Western Isles of Scotland). Middle Bronze Age mummies were buried under the floor level in a round house that was constructed about 1100–930 cal BC (68% probability) (Parker Pearson et al. 2005). Confirmation of the possible burial of the cremated remains of an ancestor can only come from a new $^{14}$C date for the grave.

The cemetery at Velzeke Paddestraat has been dated according to the study of the pottery at the beginning of the Ha A2–B1 period. Some of the urns have the previously discussed typical biconical shapes. According to the ceramic repertory for western Belgium, the last datable urns belong to the beginning of the Early Iron Age (~750 BC). One form is a transition type between the Late Bronze Age–Early Iron Age. The other is related to the Schrägrandurn, which is characterized by a sharp everted neck. Based on this information, the end phase of the funeral activities at the Paddestraat site must be situated during Ha C (De Mulder and Rogge 1995).

The necropolis at Velzeke Provinciebaan dates back to the transition of the Late Bronze Age–Early Iron Age. The urn of grave 6 dates typologically to the phase Ha B2/3 (Figure 7, #7). In the filling of this urn, a sherd has been found with Kreisdel decoration, which is typical for the Early Iron Age. Other "classical" forms of the Early Iron Age period are again 2 Schrägrandurns dating to the Ha C period and an S-shaped urn (Figure 7, #8), which archaeologists think belongs to the Ha C-D phase. The cemetery at Velzeke Provinciebaan starts at the transition of the Late Bronze Age and Early Iron Age and gets deserted probably during the period Ha D.

Based on the typochronological framework, the cemetery at Paddestraat starts at the beginning of the Late Bronze Age, and its functioning seems to stop during the beginning of the Early Iron Age. The second necropolis starts at the transition from the Late Bronze Age to the Early Iron Age. Both sites seem to exist for a period together, although they are only about 1 km apart from each other. The site Provinciebaan functions later into the Early Iron Age but stops before the Late Iron Age.

A comparison between the $^{14}$C dates and the typochronological sequence of the both sites results in a different picture:

- According to this information, the cemetery at Velzeke Paddestraat starts in the period 1200–1000 cal BC. There is a possibility that the site is a bit older than the "classical" beginning of the Late Bronze Age (around 1100 or 1125 BC) depending on the archaeological chronology used. Some of the graves yielded a younger date than hitherto expected. Two $^{14}$C dates belong to the Early Iron Age. Although they fall into the so-called Hallstatt plateau, they show that the Paddestraat necropolis has been functioning longer than previously supposed.
- The evidence for the Provinciebaan cemetery differs strongly from the assumed typochronological sequence. The use of the site seems to be a lot older than previously accepted. The $^{14}$C dates extend to the Late Bronze Age instead of the earlier transition between Hallstatt B–C. Grave 12 is still problematical because of the confusion between the date of the typical Schrägrandurn and the age of the cremated bones (see discussion above). The other dates range from 1000–800 to 470–410 cal BC. It seems plausible that the Provinciebaan necropolis starts in the transition from Ha B1 to Ha B2/3. The youngest dates correspond to the Paddestraat site. They fall into the Early Iron Age wiggle, which makes precise dating impossible. The $^{14}$C dates shed a new light upon the occupational phase of both cemeteries. Instead of succeeding each other, they seem to have been in use concurrently.
- The typochronological study of the material from Blicquy places the beginning of the cemetery in the Ha A2–B1 period at 1125–925 BC according to Lanting and van der Plicht (2001/2202) or 1100–900 BC according to Müller-Karpe (1959). Some characteristic forms for this phase of the Late Bronze Age are the typical shouldered beakers, the carinated urn, or the handled urn (Rychner 1979; De Laet et al. 1986). Most of the datable urns can be placed in this phase. Two forms seem to belong to a younger period of the Late Bronze Age. They have a rounded biconical profile with a cylindrical neck. Both are situated in the phase Ha B2/3. None of the pottery forms are identified as typical for the Early Iron Age.

The oldest $^{14}$C date from Blicquy suggests that the urnfield came into use at the transition from the 16th to the 15th century BC. Although there is only 1 date from that period, there is no indication that this date is erroneous due to contamination. Even if it is not in situ anymore, it cannot be easily excluded. Most of the dates cluster in a period delimited by the beginning of the 14th century and the beginning of the 10th century BC. This suggests that the site is a few centuries older regardless of the chronology used.

One $^{14}$C date, from grave F83, falls outside the date range. Although much younger (790–510 cal BC), this date is probably not an outlier. Two urns (urn 2 and 3 from the 1970s excavations) belong typochronologically to Ha B2/3, but are at the moment not $^{14}$C dated. This points to a probable continuation of the urnfield site until the Early Iron Age.

These first results shed new light on the transition from the Middle Bronze Age to the Late Bronze Age in western Belgium. Looking at both the $^{14}$C dates of Blicquy and Paddestraat, the phenomenon of the urnfields with their typical flat graves is older than previously suspected. Until now, they seemed to start around 1100 BC. Only 1 urn from the cemetery at Temse-Velle seemed to be older. This urn had a specific decoration, called "céramique cannelée," which in central Europe dates to the period Bronze D-Ha A1 (1300–1100 BC) (Mordant 1988). The cemetery at Blicquy indicates that this tradition of burying the deceased in "flat graves" in communal cemeteries had already started during the Middle Bronze Age. Until now, flat graves were unknown in Belgium during this period. Only burials in barrows were archaeologically recorded, although they are believed to represent only 10–15% of the population (Lohof 1991; Theunissen 1999). Taking account of this interesting fact, it will also be possible to try to interpret the start of the central European influence, under the form of the "groupe Rhin-Suisse-France orientale," on the material culture in western Belgium

during the Bronze Age. As mentioned above, it is not impossible that the start of the cemetery at Velzeke Paddestraat can be dated earlier, to 1200–1100 BC.

The transition of the Late Bronze Age–Early Iron Age in northwestern Europe has traditionally been ascribed to ~750 BC. On the basis of the typochronological study of Halstatt swords, there has been a tendency to date the beginning of this transition to around 800 BC (Pare 1991; Fokkens 2001). New $^{14}$C dates and dendrochronological studies confirm the date of 800 BC for the transition (Hennig 1994, 2001; Lanting and van der Plicht 2001/2002; Trachsel 2004). In the eastern Belgian urnfield of Neerharen Rekem, the cremated bones from a grave containing a bronze sword and 3 bronze spears, has been dated to 1000–780 cal BC (at 2 $\sigma$) (Van Impe 2001). During a rescue excavation at Landen Walshoutem (Belgium), 3 pits from a settlement were found. One of the pits contained an almost complete urn from the transition between the so-called Laufeld urn and the typical Schrägrandurn from the Early Iron Age. A fragment of charcoal from this feature gave a $^{14}$C date (2785 ± 30 BP) between 1000 and 830 cal BC (at 2 $\sigma$), older than the suggested typochronology (Van Impe et al. 2001).

Grave 6 from the Provinciebaan site confirms this absolute chronology. The combination of the pottery form and the decorative element of the burnt grave goods places this cremation at the transition from the Late Bronze Age to the Early Iron Age. The $^{14}$C date suggests an age between 810–750 (74.8%)/690–660 (13.1%)/640–550 (7.4%) cal BC. Another grave (cremation 1) contained an S-shaped urn also characteristic for the Early Iron Age. The contradiction between typological and $^{14}$C data (810–760 [94.2%]/680–670 [1.2%] cal BC at 2 $\sigma$) suggests also an older age for this urn, possibly going back to the first half of the 8th century BC.

At present, the end of the urnfield cemetery phase is difficult to date in western Belgium. Typological dates are scarce. Few cemeteries were apparently still functioning during Ha D (600–450 BC). The available data suggests they continued to be used until around 450 BC. Due to the Early Iron Age wiggle, $^{14}$C dating will not be able to contribute to solving this chronological question. A few dates from the 2 cemeteries at Velzeke show that they were still in use in this period. None of these dates is younger than the 5th century BC, which supports the notion that the urnfields disappear during the 5th century BC.

## CONCLUSIONS

$^{14}$C dating of cremated bones offers a lot of possibilities for the study of the Late Bronze Age and Early Iron Age urnfields. Until now, the chronological framework was based upon the typological study of pottery and/or metalwork. By dating the cremated bones, the human element is properly dated. This study has shown that the urnfields in western Belgium are somewhat older than expected. It appears that the urnfield phenomenon began during the Middle Bronze Age. At Blicquy, the appearance of urnfields is much more confidently ascribed than it is at Paddestraat, despite Paddestraat being older than traditionally accepted. The new transition from Late Bronze Age–Early Iron Age in central Europe situated around 800 BC is confirmed in the studied sites.

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